

Exploring the Accuracy of Managers' Network Perceptions

Geir Grundvåg Ottesen
Lene Foss
and
Kjell Grønhaug

Abstract

This study addresses the accuracy of managers' perceptions of their strategic networks, i.e., networks with which they exchange important environmental information. The accuracy of network perceptions is important for managers because their organisation often needs to adjust its positions in, and utilise, networks in response to new information needs and to fully exploit their limited time and capacity to exchange relevant information. We study the accuracy of managers' perceptions of interaction intensity with external actors to capture an important dimension of managers' and their organisations' network perceptions. By comparing managers' perceived frequency of information exchanges with an "objective" tracking of their actual behaviour, we revealed substantial perceptual errors. We also found that both the frequency and perceived importance of information exchanges with strategic network members lead to erroneous perceptions. Implications of these findings are highlighted.

Keywords: Managers, information, strategic networks, perception accuracy

Introduction

In small and medium-sized firms, senior managers play a central role in guiding and directing their firms' activities. To do so adequately, managers need timely and relevant information to take advantage of opportunities and to avoid threats that may arise. Important information is obtained through interactions with customers, suppliers, competitors, and other knowledgeable actors. Managers also interact, with for instance, customers and regulatory constituencies to exert influence (Jaworski *et al.*, 2000). This implies that firms and their managers are embedded in strategic networks encompassing multiple organisational actors

with which valuable information is exchanged (Gulati *et al.*, 2000). To take full advantage of their strategic networks, it is paramount that managers use their limited information-processing capacity to exchange timely and relevant information with the most knowledgeable or important external actors. To do so, managers need knowledge about their networks, including how much time/resources they should spend on interacting with various external actors or sectors. Accurate perceptions about how time is spent on various network members is important because it indicates whether limited attention and information-processing resources have been exploited as intended. Accurate network perceptions are also relevant to adjust strategic networks in response to changing conditions and information needs. This is particularly so when the capacity to deal with external networks is utilised to its limit and when interacting with one actor (or sector) comes at the expense of interacting with other actors/sectors. Thus, inaccurate network perceptions may impair managers' ability to allocate their limited networking resources in an adequate manner.

From the above discussion, it follows that the accuracy of managers' network perceptions is crucial for managing and adjusting strategic networks. However, research findings indicate that managers often have inaccurate perceptions of the world in which they are embedded and operate (Starbuck and Mezias, 1996; Sutcliffe, 1994). This indicates that managers' network perceptions might also be inaccurate. However, only modest research has been conducted to examine the accuracy of managers' network perceptions (for a notable exception, see Bernard *et al.*, 1981).

In this study, we limit our investigation to managers' perceptions of the interaction *intensity* within their strategic networks, i.e., the *frequency* of information exchange with different network members such as customers and other important external actors. We also address factors that may influence the accuracy of such perceptions. By examining managers' (or firms') frequencies of external information exchanges, we are capable of capturing aspects of both how they use their limited information-processing resources, as well as the accuracy of their perceptions.

The remainder of the paper is organised as follows: In the next section, the theoretical perspective is outlined. Here we draw on insights from cognitive psychology to provide an initial understanding of why and under what circumstances managers and others may fail to perceive the intensity of their network interactions accurately. We then report the research methodology underlying our empirical study of the three members of the top management team in a business firm embedded in the highly competitive seafood industry. To assess the

accuracy of managers' perceptions, we make use of two data sources, i.e., a structured questionnaire to capture managers' perceptions of the frequency of their information exchanges, and a diary to track their behaviours objectively. We report the results of our investigation, and finally, we discuss our findings and highlight their implications.

Theoretical perspective

What are the reasons, if any, to raise doubts about the accuracy of managers' perceptions of external information exchange? One answer is found in the psychology of perception, where a distinction is made between the *stimulus* and the *stimulus object* (Crech *et al.*, 1974). A stimulus object is something that is the source of a stimulus, while a stimulus can be seen as the data associated with the stimulus object reaching the perceiver. The entry of a new competitor or a substitute product, for example, are stimulus objects, which may be registered or not by the manager. The essential point is that stimuli originate in, but need not be identical with the objective changes taking place in the environment. Thus, there may arise discrepancies between what is perceived and "the real thing". An additional factor that may influence the match between managers' perceptions and actual events is that managers are exposed to more data than they can possibly register, interpret and assimilate. This relates to the observation that managers, like other people, are restricted by the limits of their cognitive capacity, i.e., their capacity to notice, interpret, store and make use of data is restricted (Simon, 1957). The limited cognitive capacity to deal with an excess of data (stimuli) makes it harder for managers (and thus organisations) to perceive their external information exchanges accurately.

In a series of studies, Bernard and colleagues compared data obtained via questionnaires and similar records with objective behavioural records, such as diaries and monitoring of radio communications. Their main conclusion was that "people do not know with any acceptable accuracy, to whom they talk over any given period of time" (Bernard *et al.*, 1981, p.15).

In the present study, we are concerned with the accuracy of managers' perceptions of the frequency of their information exchanges with important external actors. More precisely, we are concerned with how accurately managers perceive their own interactional behaviour. The literature on respondents' answers to questions about behavioural frequency in surveys gives some indications about how managers may perceive the frequency of their behaviours.

For example, from this literature it is known that both *regularity* and *frequency* influence how accurately individuals perceive their behaviours (see, e.g., Blair and Burton, 1987; Burton and Blair, 1991; Menon, 1993; Menon *et al.*, 1995). Research findings also suggest that people have the ability to learn *temporal* and *sequential* patterns, which makes memory-based information more accessible for regular behaviours (Menon *et al.*, 1995). For example, subjects may use a rate of occurrence of “twice a day” to calculate how often they brush their teeth every week. This observation is relevant because managers embedded in turbulent environments are often engaged in *irregular* exchanges of information (Aguilar, 1967; Mintzberg, 1973). Accordingly, they may find it difficult to perceive frequency accurately.

Another relevant point is that the frequency of *frequent* behaviours is not easily accessible in episodic memory (Schwarz, 1990). This is explained by the tendency for multiple instances of similar behaviours to blend into a generic representation, which makes it difficult to isolate individual episodes (Menon *et al.*, 1995). Consequently, frequency of behaviour may also affect managers’ perceptions of their information exchanges. Research findings reported by, e.g., Aguilar (1967) and Mintzberg (1973) demonstrate that managers are busy people engaged in frequent information exchanges with multiple external actors. Accordingly, information about past behaviour can be difficult to access from episodic memory, a tendency that is strengthened when such behaviour tends to be irregular.

From the above discussion it follows that *irregular* and *frequent* behaviours can be difficult or impossible to recall exactly. It should be noted that such conditions, although regarded as common, represent the most difficult situations to perceive accurately. In such situations, managers are likely to rely on *estimation strategies* to generate reasonable estimates of their behaviour (cf. Burton and Blair, 1991; Menon *et al.*, 1995). This tendency has implications for their ability to perceive accurately the frequency of their information exchange with external strategic network members. First, any estimation strategy is based, to some extent, on the experiences and expectations of the manager, which are based on past perceptions. These initial perceptions may be erroneous. Second, when trying to recall earlier experiences, expectations and perceptions from episodic memory, managers may fail to recall such information accurately. Third, as will be discussed below, the estimation strategies applied may be biased.

An important estimation strategy is the application of inferential rules or heuristics (Tversky and Kahneman, 1974). These heuristics are applied subconsciously and are helpful in reducing complex mental tasks to simpler ones (Fiske and Taylor, 1991). An important

heuristic is the *availability* heuristic (Tversky and Kahneman, 1973). Availability refers to the accessibility of events in the subject's memory and is based on the previous experience of the subject. Thus, the availability heuristic may lead people to perceive a future event to be likely or frequent if it is easy to recall past occurrences of that event (Fiske & Taylor, 1991; Schwenk, 1988; Tversky & Kahneman, 1973). An event that "sticks out" (e.g., an unexpected visit from a potential customer) is easy to recall because its *salience* increases the availability of the event in memory. The important point is that, when associations are readily and easily brought to mind, this might inflate subjects' estimates of frequency (Fiske and Taylor, 1991). Consequently, it seems likely that the significance of an event may influence the accuracy of judgements because salience may lead subjects to *overestimate* some attribute of an event in general, e.g., its frequency. For example, the visit of a significant customer may lead a manager to overestimate the frequency of customer visits in general.

The above discussion indicates that frequent and irregular behaviours are not easily accessible from episodic memory, which means that the frequency of such behaviours is difficult to recall accurately. In such situations, people tend to rely on estimation strategies to make the best possible assessments. In particular, the sub-conscious application of the availability heuristic seems to be a likely path. This strategy may, however, lead to persistent biases in subjects' perceptions, as both the frequency and significance of certain behaviours may lead to less accurate estimates of the frequency of the same behaviours. The influence of such factors on accuracy in frequency perceptions may, however, vary across managers in a top management team. For example, team members usually have different tasks, and, since they tend to focus on the activities they are involved in, they may often vary in their perception of salience or vividness (cf. Dearborn and Simon, 1958). In addition, team-managers usually occupy roles with varying degrees of contact with different types of external actors and may thus be exposed to partly different information environments. This implies that the types of external actors, and information that are easy to recall may vary across managers in a team. Present insights are, however, modest and make it difficult to advance specific predictions (hypotheses) about the extent to which managers over- or underestimate their frequencies of external information exchanges.

Method

This section reports the research methodology underlying the empirical study aimed at examining the accuracy of managers' perceptions of the frequency of information exchange with strategic network members. We first describe the choice of research design and proceed to describe data sources and measurements.

Design of study

For the purpose of this research we chose to study a top management team with three members. To examine the accuracy of managers' perceptions, an objective standard or measurement is needed (Starbuck and Mezias, 1996) in addition to capturing perceptions of their information exchange behaviours. The study should also include a sufficient number of observations (i.e., information exchanges) to make statistically valid conclusions. To meet these design requirements, we made use of two distinct sets of primary data: A self-report diary in which managers reported their exchanges of information with external actors served as an objective standard, and a questionnaire was used to capture perceptions. In this way, we were able to investigate aspects of both how limited information-processing resources are utilised and the accuracy of perceptions.

Setting

Three members of the top management in one business firm, Alfa, constitute our subjects. Alfa is a medium-sized firm in the Norwegian seafood industry, a turbulent industry in which firms (including Alfa) typically sell low-to-moderately differentiated seafood products in highly competitive global markets. The industry has experienced several shakeouts due to over-capacity caused by sudden drops in fishing quotas (Dreyer and Grønhaug, forthcoming). In spite of turbulent conditions, Alfa's profitability has put it among the top 25% of firms in the filleting branch of the industry for the last three years. Appendixes 1 and 2 show selected characteristics of Alfa and its three top managers.

Data collection

We visited the firm, and explained the purpose of the research to the managers, emphasising its practical usefulness. It was promised that the results and their practical implications would be presented to the firm both in oral presentation and in confidential written reports. The managers at Alfa were enthusiastic and seemed highly motivated to participate. Note that the diary was developed as part of a large research program focusing on organisation development aimed at researching several other issues in addition to those reported here. The research based on the diary served to meet a request from the managers, who wanted to know “How do we spend our time?” and “Can we be more efficient in what we do?” The fact that the research was requested and that several issues were covered, probably explains the high motivation for participating in the research. Their high motivation was important because the filling-in of a diary is a demanding task which requires highly motivated subjects, and because motivated subjects are assumed to be more accurate in their reports (Peterson and Kerin, 1981).

The diary

The aim of the diary was to capture the frequency of the managers’ information exchanges with external actors, which included face-to-face encounters (e.g., customer visits), phone calls, and fax messages. Because managers usually interact with a very large number of different external actors, a classification of external actors into a manageable number of sectors was needed to make the diary. The construction of these sectors was made in close co-operation with the managers. During this stage, the managers were interviewed. These interviews took place very much as conversations, with emphasis on letting the managers play the active role. We were careful not to impose any classification scheme on the managers to ensure that the resulting categories reflected the realities and embeddedness of the firm as perceived by the managers (Grønhaug and Lines, 1995; Starbuck and Mezias, 1996). For example, based on discussions with the managers, other firms in the industry were classified as “other manufacturing firms” rather than “competitors”, as suggested by conventional classification schemes (e.g., Porter, 1980). In total, 11 environmental categories or sectors were constructed. A range of subcategories was also constructed to make it easier for the

managers to find a category for every new actor. These categories and subcategories are shown in Table I.

Table I. Categories listed in the diary

<i>Categories</i>	<i>Subcategories</i>
Manufacturing firms	
Interest groups:	-five professional and industrial bodies listed
Suppliers:	-accountants -insurance companies -financial services providers -haulage companies -computer services -providers of additives -providers of production equipment/parts -providers of packaging materials
Raw materials suppliers	
Customers:	-Norwegian customers -Norwegian export companies -foreign customers
Consultancies	
Politicians	
Governmental bodies:	-social security office -employment office -tax office -Directorate of Immigration -Ministry of Fisheries -quality inspection authorities
County administration:	-development program
Municipal administration:	-harbour authorities -city manager -immigration officer
Local community:	-schools -local associations

The diary was presented as a ring leaf file in which each information exchange was to be entered on a separate sheet. The managers were instructed to register each information exchange immediately, or as soon as possible after it had occurred, by means of an “x”. To some extent, this involves perception of one’s own behaviours. But here, managers register the individual external information exchanges without any frequency estimates. Although the

managers may misclassify or overlook some external interactions¹ we believe that frequency estimates based on such data will produce quite accurate accounts of external information exchanges. The firm was visited several times to carefully instruct the managers. A one-day test run of the diary was conducted to sort out any remaining misunderstandings. The log-period lasted 24 consecutive working days, covering five weeks. Altogether, the three managers reported 225 encounters in which information was exchanged with external actors.

The questionnaire

To capture managers' perceptions of their information exchanges with external actors, we used a structured questionnaire. The design of the questionnaire reflected the main environmental sectors used in the diary. One set of questions served to capture managers' perceived frequency of information exchange, i.e.: "How often do you exchange information with 'sector xxx'?" These questions were scored as shown in Appendix 3. To capture the significance of exchanging information with each environmental sector, the managers were asked to report how important it was for them to exchange information with each external sector, i.e.: "How important is it for you to exchange information with 'sector xxx'?" The questions concerning importance were scored on a scale from 1 to 7, where 1 = "no importance at all", and 7 = "very important".

Findings

In this section, we present our findings. We first report how the top management team interacts with various external sectors. We also report the accuracy of the team and the managers' perceptions of the frequency of information exchanges. Then we proceed to report whether and to what extent the frequency and salience of information exchanges influence perception accuracy.

¹ Two factors might have led managers to overlook interactions. First, in busy periods managers found it difficult to report all information exchanges due to lack of time. Second, the managers were absent for several days, e.g., when visiting customers, attending industry conferences and so on. For practical reasons, the managers did not take the diary on these trips, which means that some days are missing from the diaries.

Environmental Contact and Perception Accuracy

Table II reports the perceived and observed frequency of information exchange for the top management team. By looking at the top management team as a whole, we get a good “picture” of its environmental contact. It can be seen that the intensity of external contact varies substantially across environmental sectors. By inspecting the second column, actual frequency, we can see that “suppliers” are by far the sector with which the team has had most contact.

Table II. The top management team: Perceived and actual frequency of information exchange with external sectors.

External sector ^a	Perceived frequency/week	Actual frequency/week	Difference ^b (%)
Manufacturing firms	11	5.12	115
Interest groups	3.25	0.44	639
Suppliers	7	16.4	-57
Raw materials suppliers	1.75	2.04	-14
Customers	13	6.4	103
Consultancies	7.75	7.04	10
Politicians	0.75	0.2	275
Gov't. Bodies	2.75	4.2	-35
County adm.	0.5	0.2	150
Municipal adm.	3	0.64	369
Media	0.75	1.32	-43
Local community	3.25	4.36	-25
Mean ^c (SD)	4.56 (4.17)	4.03 (4.61)	153 (189)
Sum	54.75	48.36	13.21

^a The perceived and actual frequencies of information exchange represent the sum of the three managers' reports.

^b Difference is computed as: (perceived frequency – observed frequency) x 100/observed frequency.

^c T-test for difference between perceived and actual frequency of information exchange: not significant.

Table II, reveals that, in most instances, differences between actual and perceived numbers of contacts are substantial. For example, the perceived frequency of information exchange with suppliers is almost 60% less than the observed frequency, while perceived frequency of information exchange with interest groups is more than 600% higher than the observed frequency. Table II also shows that the mean difference between perceived and observed frequencies (calculated from absolute values) is more than 150%!

In order to assess the perceptual accuracy of each individual manager, and the extent to which they differ in their perceptual accuracy, we calculated the percentage differences between perceived and observed numbers of contacts for each manager and each sector. This is reported in Table III.

Table III. The accuracy of managers' perception of frequency of information exchange with external sectors

<i>External Sectors</i>	<i>Managers</i>		
	A ^a	B	C
Manufacturing firms	-29	60	733
Interest groups	108	1150	n.a.
Suppliers	-24	-82	-77
Raw materials suppliers	-86	n.a.	150
Customers	525	150	-46
Consultancies	155	-44	-58
Politicians	150	n.a.	0
Gov't. Bodies	-76	-21	0
County adm.	25	n.a.	0
Municipal adm.	n.a.	291	0
Media	-81	n.a.	n.a.
Local community	25	-37	n.a.
Mean ^b (SD)	117 (144)	229 (382)	118 (236)
Sum perceived/actual frequency	16.76/24	21.20/20.75	10/10.40

^b The measure for accuracy is percentage deviations from actual observations, computed as: $(\text{perceived frequency} - \text{observed frequency}) \times 100 / \text{observed frequency}$.

^a T-test for difference between mean values: not significant.

From Table III, we can see that the individual mean differences for each manager range between 117 and 229%. The average difference between actual and perceived frequency of external information exchange for the management team reported in Table II is 153%. Compared with the means, large differences between the individual managers are observed. Based on the differences between perceived and observed frequencies of contact, we see that the three managers make substantial perceptual errors regarding the frequency of their information exchanges. Inspection across the managers also shows that they both under- and overestimate the frequency of information exchange for the same external sectors. There appears to be little consistency across observations, as estimates vary substantially both across managers and sectors without any clear pattern. The only exception is that “Suppliers” is the

only sector for which all three managers *underestimate* the frequency of information exchange. This finding may, however, be a result of the methodology. As can be seen from Table I, a range of different types of suppliers was listed in the diary, but in the questionnaire, there was only one category to subsume this wide range of actors. This implies that in the questionnaire, “Suppliers” may have been too wide a category and thus it might have been difficult to estimate the extent of information exchange, which probably explains the underestimated frequencies.

Factors influencing perception accuracy

In the theoretical discussion, we argued that, since managers in a team will often differ in their environmental focus, they might also differ in their perception of salience as well as in the intensity of their interaction with external actors. Both the frequency and salience of events (i.e., information exchanges) might lead to less accurate perceptions of frequency. To assess the influence of these factors on perception accuracy, we calculated rank correlations between (1) observed frequency and inaccuracy, and (2) perceived importance and inaccuracy. The results of the rank correlations are reported in Table IV.

Table IV. Correlations (Spearman’s rho) of frequency and importance with inaccuracy

	<i>Frequency/Inaccuracy (n)</i>	<i>Importance/Inaccuracy (n)</i>
Team	.110 (28)	.420* (28)
Manager A	.057 (11)	.042 (11)
Manager B	-.623 (8)	-.489 (8)
Manager C	.703* (9)	.886** (9)

** = $p < .01$, * = $p < .05$

Inspection of Table IV shows that rank correlations between frequency and inaccuracy are positive for the team and for two of the team members, indicating that, as frequency increases, perceptions become less accurate. However, the results are not statistically significant (except for Manager C). Table IV also shows that the rank correlation between importance and inaccuracy is positive, both for the team and for two of the managers. This indicates that, as importance increases, perceptions become less accurate. Results are statistically significant for the team and for Manager C. The results correspond, to some extent, with our theoretical

assumptions that significant/frequent events may lead to erroneous perceptions. However, inspection of Table IV shows that managers B and C display opposite tendencies. This is an intriguing finding. But, unfortunately, the present data does not allow us to examine this result in more detail.

Discussion

Information exchanges with external actors are a crucial dimension of managers' and firms' strategic network activities (Gulati *et al.*, 2000). Because managers and firms have limited informational capacity, accurate network perceptions are needed to fully exploit their information-processing resources and to network as required. Our findings show that the three managers studied here make substantial perceptual errors, and that they both under- and overestimate their intensity of information exchanges with strategic network members. The results also show that accuracy of perception may both increase and decrease when both the frequency of information exchanges increases, and when information exchange is perceived as important.

In spite of rather inaccurate managerial perceptions about their strategic networks, Alfa performs well in a highly competitive and rapidly changing environment. This indicates that Alfa's top management has been able to adapt the firm to significant environmental changes. How can this apparent paradox be explained? A possible explanation is that, when faced with important strategic decisions, managers carefully discuss the various issues involved. In this way they are likely to calibrate their environmental perceptions, which might lead to improved accuracy. Another explanation might be that slack resources insulate the firm and its managers from harsh consequences (Starbuck and Mezias, 1996). Finally, our dependent variable (firm performance) might have been too coarse-grained to capture the effects (if any) of inaccurate network perceptions measured against a 24-day standard (i.e., the diary). Accordingly, the fact that Alfa performs well in spite of managerial misperceptions about their networking intensity should not be interpreted as meaning that managers might get away with inaccurate perceptions.

Our focus on the accuracy of managers' perceptions of the frequencies of their own behaviour is relevant since researchers often ask managers, or other organisation members, to report frequencies of behaviour, e.g., numbers of hours worked, meetings, interruptions and contacts. They are asked to report these behaviours to indicate how they use their time, to

indicate importance, or to capture some other relevant aspects of their behaviour. Perceptions of frequencies are also used to develop and/or test theories about managers and/or the behaviour of their organisations. For example, a common way of measuring organisations' environmental scanning is to ask boundary-spanning personnel to report how often they receive certain types of external information (see, e.g., Aguilar, 1967; Hambrick, 1982). It is also common among network researchers to measure various dimensions of actors' networks by means of perceptual measures of frequency behaviour. For example, tie strength has typically been measured by a single item asking respondents to report the intensity of interaction with external actors (see, e.g., Granovetter, 1973). The reported findings show that actors can make substantial errors when reporting the frequency of their own behaviour, indicating that such measures can be a serious threat to the reliability and validity of conclusions drawn from such data. In line with Bernard *et al.* (1981), we recommend that the quality of network measurement must be improved. This argument should, however, be balanced against whether one seeks to measure actually existing networks, or networks as perceived by the actors involved. Clearly, the appropriate measurements should differ according to the research problems at hand (Marsden, 1990). For example, accurate knowledge of actually existing networks is needed to study how network structure influences access to information and should thus be subject to the cautions raised above. On the other hand, researching actors' network perceptions and their effect on behaviour, requires *perceptual* data because perceptions, rather than objective characteristics of the environment, form the basis for decisions and actions (cf. Weick, 1979).

Our results also have practical implications. The managers studied here have rather inaccurate knowledge of the frequency of their own behaviour. This is, however, not surprising since people seldom or never get the kind of feedback they need to adjust their perception of frequency behaviour (and a range of other behaviours). This implies that managers should consider carefully the possibility of erroneous perceptions and the potential cognitive biases caused by the frequency and perceived significance of behaviours.

References

- Aguilar, F.J. (1967), *Scanning the Business Environment*, The Macmillan Company, London.
- Bernard, H.R., Kilworth, P.D., and Sailer, L. (1981), "Summary of research on informant accuracy in network data, and on the reverse small world problem", *Connections*, Vol. 4, No. 2, pp. 11-25.
- Blair, E., and Burton, S. (1987), "Cognitive processes used by survey respondents to answer behavioral frequency questions", *Journal of Consumer Research*, Vol. 14, No. 2, pp. 280-288.
- Burton, S., and Blair, E. (1991), "Task conditions, response formulation processes, and response accuracy for behavioral frequency questions in surveys", *Public Opinion Quarterly*, Vol. 55, No. 1, pp. 50-79.
- Crech, D., Crutchfield, R., and Livson, D. (1974), *Elements of Psychology*, Alfred A Knopf, New York.
- Dearborn, D.C., and Simon, H.A. (1958), "Selective perception: A note on the departmental identification of executives", *Sociometry*, Vol. 21, pp. 140-144.
- Dreyer, B., and Grønhaug, K. (forthcoming), "Uncertainty, flexibility and sustained competitive advantage", *Journal of Business Research*.
- Fiske, S.T., and Taylor, S.E. (1991), *Social Cognition*, McGraw-Hill, New York.
- Granovetter, M.S. (1973), "The strength of weak ties", *American Journal of Sociology*, Vol. 78, No. 6, pp. 1360-1380.
- Grønhaug, K., and Lines, R. (1995), "Managerial focus in changing environments", *Scandinavian Journal of Management*, Vol. 11, No. 3, pp. 283-293.
- Gulati, R., Nohria, N., and Zaheer, A. (2000), "Strategic networks", *Strategic Management Journal*, Vol. 21, No. 3, pp. 203-215.
- Hambrick, D.C. (1982), "Environmental scanning and organizational strategy", *Strategic Management Journal*, Vol. 3, No. pp. 159-174.
- Jaworski, B., Kohli, A.K., and Sahay, A. (2000), "Market-driven versus driving markets", *Journal of the Academy of Marketing Science*, Vol. 28, No. 1, pp. 45-54.
- Marsden, P.V. (1990), "Network data and measurement", *Annual Review of Sociology*, Vol. 16, pp. 435-463.
- Menon, G. (1993), "The effects of accessibility of information in memory on judgements of behavioral frequencies", *Journal of Consumer Research*, Vol. 20, No. 3 December, pp. 431-440.

Menon, G., Raghurir, P., and Schwarz, N. (1995), "Behavioral frequency judgements: An accessibility-diagnostics framework", *Journal of Consumer Research*, Vol. 22, No. 3, pp. 212-228.

Mintzberg, H. (1973), *The Nature of Managerial Work*, Harper and Row, New York.
Peterson, R.A., and Kerin, R.A., (1981), "The quality of self-report data: Review and synthesis", in B.M. Enis and K.J. Roering (eds.), *Review of Marketing 1981*, American Marketing Association, Chicago, pp. 5-20.

Porter, M.E. (1980), *Competitive Strategy*, The Free Press, New York.

Schwarz, N., (1990), "Assessing frequency reports of mundane behavior: contribution of cognitive psychology to questionnaire construction", in C. Hendrick and M. S. Clark (eds.), *Research Methods in Personality and Social Psychology*, Sage, Newbury Park, pp. 98-119.

Schwenk, C.R. (1988), "The cognitive perspective on strategic decision making", *Journal of Management Studies*, Vol. 25, No. 1, pp. 41-55.

Simon, H.A. (1957), *Models of Man: Social and Rational*, Wiley, New York.

Starbuck, W.H., and Mezias, J.M. (1996), "Opening Pandora's box: studying the accuracy of managers' perceptions", *Journal of Organizational Behavior*, Vol. 17, No. 2, pp. 99-117.

Sutcliffe, K.M. (1994), "What executives notice: accurate perceptions in top management teams", *Academy of Management Journal*, Vol. 37, No. 5, pp. 1360-1378.

Tversky, A., and Kahneman, D. (1973), "Availability: A heuristic for judging frequency and probability", *Cognitive Psychology*, Vol. 4, pp. 207-232.

Tversky, A., and Kahneman, D. (1974), "Judgement under uncertainty: Heuristics and biases", *Science*, Vol. 27, pp. 1124-1131.

Weick, K.E. (1979), *The Social Psychology of Organizing*, 2.ed., Addison-Wesley, Reading.

Appendix 1. Some firm characteristics

Established	1939
Turnover	1998: 102 NOK mill
Profitability (ROI)	1998: 6.9% 1997: 13.7% 1996: 9.9%
Products	Alfa produce two main types of frozen seafood products from whitefish species (cod, haddock and saithe): (1) Speciality products (various types of cuts from fish fillet) and (2) Commodities (fish fillet and cuts from fish production, which are mixed and frozen into a standardised fish block). The fish block is used by Alfa's customers in secondary processing, in production of fish fingers and other value-added frozen seafood products.
Customers	Speciality products mainly sold through Norwegian and Danish wholesalers. Other products (with less value added) are mainly sold to large customers in the UK, France and Germany. In 1997, the five largest customers bought 79% of Alfa's total sales.
Top management team	General manager, second-in-command, sales and production manager
Other staff and workers	Alfa has 5 administrative staff and 5 middle managers responsible for various aspects of production, and employs some 130 workers in production.

Appendix 2. Managerial characteristics and tasks

General Manager (Manager A)	<p><i>Age:</i> 60 years.</p> <p><i>Education and work experience:</i> two years of business administration. Took over the company after his father and has been general manager for the last 28 years.</p> <p><i>Main tasks and responsibilities:</i> Runs the company. Alfa's main contact with its largest customers and suppliers. This contact involves negotiations and contracts. Holds board positions in industrial bodies and one large investment firm.</p>
Second-in-Command (Manager B)	<p><i>Age:</i> 32 years.</p> <p><i>Education and work experience:</i> Master of Management. Worked for four years in governmental agencies. Has been part of the top management team for three years.</p> <p><i>Main tasks and responsibilities:</i> Organisational development. Alfa's main contact with governmental agencies. Also engaged in various joint projects with local firms. Board member in two local firms.</p>
Sales and Production Manager (Manager C)	<p><i>Age:</i> 34 years.</p> <p><i>Education and work experience:</i> MSc in Fisheries. Has been part of the top management team for eight years.</p> <p><i>Main tasks and responsibilities:</i> Purchasing, production, sales and information technology. Takes care of the implementation of customer contracts and sells Alfa's commodity products (frozen fish block). The sales and production manager is the main link between customers and production. Also engaged in various joint projects with local firms.</p>

Appendix 3. Scores and transformation for frequency of information exchange

<i>Scores: Frequency of contact</i>	<i>Transformation to frequency per week</i>
Never	0
Once a month	0.25
2–3 times a month	0.5
Once a week	1
2–3 times a week	2.5
Once a day	5
Several times a day	10